

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 11 April 2001 (11.04.01)	
International application No. PCT/GB00/02656	Applicant's or agent's file reference visiput
International filing date (day/month/year) 11 July 2000 (11.07.00)	Priority date (day/month/year) 19 August 1999 (19.08.99)
Applicant HARPAZ, Yehouda	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 07 February 2001 (07.02.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer S. Mafla Telephone No.: (41-22) 338.83.38
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REC'D 02 OCT 2001

WIPO PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference visiput	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/02656	International filing date (day/month/year) 11/07/2000	Priority date (day/month/year) 19/08/1999
International Patent Classification (IPC) or national classification and IPC A63F3/02		
Applicant HARPAZ, Yehouda		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 7 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☒ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 07/02/2001	Date of completion of this report 28.09.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Squeri, M Telephone No. +49 89 2399 8417 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02656

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-7 as originally filed

Claims, No.:

1-7 as originally filed

Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02656

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	4
	No:	Claims	1-3,5-7
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-7
Industrial applicability (IA)	Yes:	Claims	1-7
	No:	Claims	

2. Citations and explanations
see separate sheet

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB00/02656

Reference is made to the following documents:

D1: GB-A-2019226
D2: WO 98/19758
D3: WO 97/26057
D4: EP-A-403130
D5: WO 00/57972

SECTION V:

1. The document D2 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses (cf. D2: page 1, lines 68-100 and page 1, line 114- page 2, line 8 and Fig. 3C) an electronic board comprising:
 - a. a grid of grid points on a flat surface,
 - b. where each grid point is a visible element
 - c. which is capable of detecting when it is pressed (page 3, lines 10-11), and
 - d. can be illuminated in two different colours, allocated to respective players, by an illumination source inside or below the surface (page 3, lines 11-15 and lines 34-37); and
 - e. a game manager 11 made of a CPU and memory, connected electronically to the grid points and illumination sources such that it has complete control on which grid point is illuminated and in what colour, and it is notified whenever any of the grid points is pressed, and
 - f. a computer program (page 1, lines 12-14) which is executed by the CPU, which manages a one or more games.

The subject-matter of claim 1 differs from this known electronic board merely for the introduction of new rules according to which at least one game is played. However, the rules for playing a game are mentioned in Rule 67.1.iii PCT and, therefore, these features do not limit the subject-matter of claim 1 and no examination is required for them.

Consequently, the subject-matter of claim 1 of the present application has the same technical features as the device disclosed in D2 and, therefore, claim 1 does not meet the requirements set forth in Article 33.2 PCT.

2. Each of the documents D3 and D4, considered independently from D2, is also

considered to anticipate all the technical features of claim 1 (cf. D3: page 1, lines 25-27, page 3, lines 3-12 and page 4, lines 20-31; D4: column 4, lines 20-52 and column 5, line 58- column 6, line 2).

3. Moreover, also document D1 is considered to destroy the novelty of claim 1 because in this claim the illumination of the grid points, which is introduced by a "can", is considered to be merely an option and, therefore, it is considered that it does not limit the subject-matter only to the electronic boards with an illumination source.
4. It is also drawn to the attention of the applicant that, also if claim 1 would have been amended in order to render all the features technical (for example disclosing the rules of the game as features of the electronic board, and not as rules for the new game as such), in any case it would have not been possible to find an objective technical problem which would have been overcome from the applicant with the electronic board disclosed in this new claim 1 and, consequently, the subject-matter of this new claim would have not been considered as involving an inventive step (Article 33.3 PCT).
5. Furthermore, the following objections about the dependent claims are raised:

Claim 2

No novel feature can be perceived with regard to D2 or D3 or D4.

Claims 3 and 5

These claims introduce merely new rules for playing the game, rather than defining the apparatus in terms of its technical features. Therefore, claims 3 and 5 do not add any technical feature to the subject-matter of the preceding claims (Rule 67.1.iii PCT).

Claim 4

It is apparent from D2 that a hexagonal pattern of the points could not be considered as involving an inventive step (cf. D2: page 2, lines 18-25 and page 3, lines 6-8).

Claims 6 and 7

Document D4 already discloses an implement which is used for pressing a point and, therefore, for communicating with the board.

SECTION VI:

6. Although D5 (Filing date: 23.03.2000; Priority date: 29.03.99; Publication date: 05.10.2000) is not prior art according to R. 64.1(a) PCT, it should be noticed that it discloses subject-matter which is considered very relevant in respect of what is claimed in the present application.

SECTION VII:

7. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2.b PCT).
8. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D5 is not mentioned in the description, nor are these documents identified therein.
9. Claim 1, the wording "...manages a one or more games ..." should probably have read "...manages one or more games ...".

SECTION VIII:

10. Some of the features in the apparatus claim 1 relate to a method of using the apparatus rather than clearly defining the apparatus in terms of its technical features. The intended limitations are therefore not clear from this claim, contrary to the requirements of Article 6 PCT. In order to overcome this objection, the features relating to the computer game should have been written in the form "means for".

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference visiput	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/ 02656	International filing date (day/month/year) 11/07/2000	(Earliest) Priority Date (day/month/year) 19/08/1999
Applicant HARPAZ, Yehouda		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

4



None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

GB 00/02656

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 A63F3/02 A63F3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A63F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 019 226 A (ATARI) 31 October 1979 (1979-10-31) page 1, line 68 - line 100 page 1, line 114 -page 2, line 8 claims 1-5; figure 1 ---	1,2
A	WO 98 19758 A (GOLAD) 14 May 1998 (1998-05-14) the whole document ---	1,2
A	WO 97 26057 A (TIGER ELECTRONICS) 24 July 1997 (1997-07-24) the whole document ---	1
A	EP 0 403 130 A (NELSON ET AL.) 19 December 1990 (1990-12-19) column 4, line 20 -column 6, line 9 --- -/--	1,2

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

18 September 2000

Date of mailing of the international search report

27/09/2000

Name and mailing address of the ISA
 European Patent Office, P.B. 5818 Patentlaan 2
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Authorized officer

Raybould, B

INTERNATIONAL SEARCH REPORT

International Application No

GB 00/02656

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 244 635 A (SASAKI ET AL.) 13 January 1981 (1981-01-13) the whole document -----	1,2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

GB 00/02656

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
GB 2019226	A	31-10-1979	DE	2915137 A	25-10-1979
			JP	54140631 A	01-11-1979
WO 9819758	A	14-05-1998	NL	1004407 C	08-05-1998
			AU	4728297 A	29-05-1998
			CN	1235558 A	17-11-1999
			EP	0935491 A	18-08-1999
WO 9726057	A	24-07-1997	US	5743796 A	28-04-1998
			AU	7430796 A	11-08-1997
EP 403130	A	19-12-1990	AU	5701390 A	20-12-1990
			CA	2018955 A	14-12-1990
			GB	2232898 A, B	02-01-1991
			JP	3097476 A	23-04-1991
			ZA	9004601 A	24-04-1991
US 4244635	A	13-01-1981	NONE		

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
1 March 2001 (01.03.2001)

PCT

(10) International Publication Number
WO 01/14026 A1

(51) International Patent Classification⁷: A63F 3/02, 3/00

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(25) Filing Language: English

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(30) Priority Data:
9919551.3 19 August 1999 (19.08.1999) GB
0002736.7 8 February 2000 (08.02.2000) GB

(71) Applicant and

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(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ,

DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

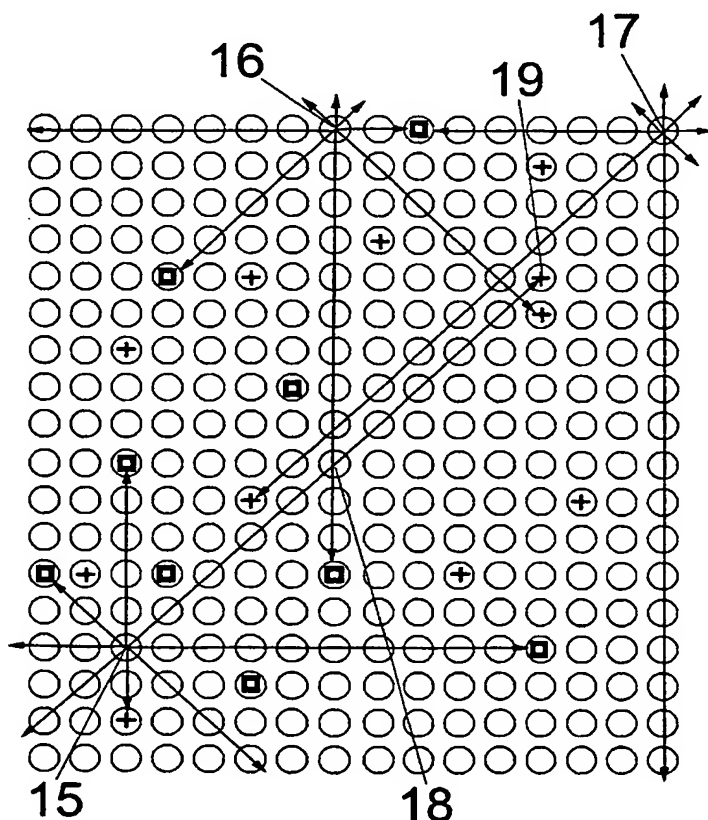
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:

— With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: GAMES GRID BOARD



(57) Abstract: A board is made of many grid points 1 & 2 arranged in a grid on a flat surface 6, and connected to a game manager 3 (a CPU + memory + software). Each grid point notifies the games manager when it is pressed, and the games manager can illuminate each grid point by one of two colours. The board plays a game in which a point is a legal move if its "visibility" for the player is above or equal some value. The "visibility" of a point is determined by checking in turn each of a predefined set of imaginary straight lines emanating from the point. If the line does not pass through any illuminated point, it is assigned a value of 0. Otherwise the line is assigned a value of 1 if the closest illuminated point that it passes through is illuminated in the colour of the player, or -1 if it is in the opponent's colour. The sum of the values of the lines is the "visibility" of the point for the player.

WO 01/14026 A1

Games grid Board

This invention relates to board games in which a move is done by indicating a point on the board, and the state of the game is expressed in the state of the points. These include traditional games like Go, but also large number of other potential games, puzzles and exercises. The invention presents an electronic board to play these games, and a new kind of game to play on it.

Games like Go are played by each player, in his turn, adding a pebble to the board, on one of the points in a grid of lines drawn on the board, or in one of the squares on the board. These games have the advantages of being based on simple playing acts and being interesting intellectually. Their disadvantages are:

- 1) They require somewhat tricky movement when putting the stone on the board in the right place without disturbing other stones.
- 2) They tend to suffer from delays when a player is thinking on a move.
- 3) Some of the moves require additional 'housekeeping' operations, e.g. taking stones of the board in Go.
- 4) The players need to keep the rules and do the counting of stones themselves, which puts extra demand on the players.
- 5) The stones are separate objects, which are easily lost.

Disadvantages 3-5 can be solved by programming a computer to display the board and stones. The program would be simple enough that it can be put on a small and cheap CPU, and hence be built into a standalone playing board. In principle, the computer could also limit the time allocated to each player, thus solving disadvantage 2.

The problem of input (disadvantage 1), however, is not solved so well by current electronic systems. That is because input for existing electronic systems is normally done through buttons, or other devices, which are separated from the display. For games where there is a small repertoire of possible different inputs this is acceptable, but for board games there are many possible different inputs (the number of points in the grid). Inputting a point on buttons off the display requires the players to perform some mental operation to convert the point they think about to the right input. This is relatively slow and error-prone process. For slow-going games that is very annoying but may be acceptable, but it makes it impossible to play fast on these systems, and for most people this is a decisive factor.

This disadvantage can be overcome by making a board in which the input and the display are together, and these kind of boards started to appear, at least in the form of patent applications. However, the range of the games that can be played on these board is still limited. The current invention describes such a simple board and a novel games with many interesting variations which can be played on it.

The conceptual structure of the hardware of the board is sketched in Figure 1.

According to the current invention the user accessible part of the board is made of *grid points* 1 & 2 which are arranged in a grid on a flat surface 6. Each grid point is a clearly visible element 1 which can detect when it is pressed, and can be illuminated in at least two colours by an illumination source 2 in or below the surface. The figure shows only 3 grid points for clarity, but the actual board has many more grid points (typically 36 - 1000). The figure also shows the illumination source 2 separately from the visible part of the grid point 1, which denotes the fact that pressing a grid point does not affect its illumination. All the grid points are connected to a *games manager* 3, which is a CPU + memory + software. When a grid point is pressed, the games manager 3 is notified (arrows from the visible part 1 to the games manager 3), and the games manager 3 controls which sources of illumination are on (arrows from the games manager 3 to the sources of illumination 2). The games manager is programmed to manage various games. Managing a game means that the board displays the state of the game by putting on the appropriate sources of illumination 2. When a sensor 1 is pressed, the games manager computes the implication according the rules of the current game, and changes some of the sources of illumination 2 (possibly none) to reflect the new state of the game. The board may also change which sources of illumination are on when no point is pressed. This board can be used to implement many games.

According to the current invention, some of these games are variations of the novel game *Visiput*. The basic rules of *Visiput* are:

Each player in their turn switch on an unilluminated point with their colour by pressing it, provided it is a legal move. A point is a legal move if its 'visibility' for the player is above or equal to some fixed number. The 'visibility' of a point is determined by checking in turn each of a predefined set of imaginary straight lines emanating from the point. If the line does not pass through any illuminated point, it is assigned a value of 0. Otherwise the line is assigned a value of 1 if the closest illuminated point that it passes through is illuminated in the colour of the player, or -1 if it is in the opponent's colour. The sum of the values of the lines is the 'visibility' of the point for the player. The game ends when neither of the players has a legal move, and the player with more points of his/her colour wins.

To allow the users to utilise all the functionality of the board, it will need a control area 4, which allows the players to change the current game, change the rules of the current game and change other parameters, like the length of time that each player has to perform his move. The control area 4 also displays the current score of the game. Typically, the control area will contain few control buttons and an alphanumeric display. The games manager receives information from the control area about which control buttons were pressed, and controls what is displayed in the alphanumeric display.

The basic functionality of the games manager comprises these actions:

- 1) When the users indicate through the control area 4 that they want to change the current game or any of the parameters of the current game, the game manager sets its own internal state to the new value, and indicates to the users the new value.
- 2) When one of the grid points is pressed and the current game and parameters make it illegal for the current player to press some of the points, the games manager checks if the pressed point is allowed according to the rules and parameters of the current game and the current state of the game (i.e. which points are illuminated). If the pressed point is not

allowed, the games board may issue some indication that an illegal point was pressed, may indicate why it is not allowed by some message through the control area 4, and may indicate which points are allowed (e.g. by flashing them). Note that illuminated points, while typically are not allowed, may be allowed in some games .

3) When a point is pressed and it is allowed according to the current rules, parameters and state of the game, the games manager computes the implications and then changes the illumination of some (possibly zero) points to reflect the new state of the game. Note that:

- a) While typically the point that is pressed changes its illumination, this is not mandatory.
- b) Other points except the pressed point may change as well.

4) If the rules of the current game require it, the games manager changes the illumination of some points even when none of the points is pressed, typically once each some time period (or 'generation').

5) After each change to the illumination of any grid point, the games manager computes the current score and displays it using the control area 4.

6) After each change to the illumination of any grid point, the games manager checks, using a game-specific routine, if the game is finished. If the game is finished, the games manager indicates it, typically by some message in the control area 4, and maybe other additional signals.

The board will also need a way to signal whose turn it is, which would typically be done by two *turn lights* 5, which are in two separate colours, corresponding to two of the colours of the illumination in the grid points. The games manager controls these turn lights, and signal to the players whose turn it is by switching the corresponding turn light.

The arrangement of the grid points would be in most cases square as in Figures 3 and 4, but can also be of different shapes (e.g. rectangular, hexagonal (as shown in Figure 5), triangular or less regular). The overall shape of the board would typically be square, but can also vary.

The kind of games that the board will be programmed to play include (but not restricted to):

- 1) Traditional two-person games like Go, where each player is associated with one colour.
- 2) Novel two-person games like the one described in this invention.
- 3) Puzzles and single-player games.
- 4) *Fluid games*, which means games where the patterns of illuminated points changes even when the player(s) don't press any point.
- 5) Memory games.

The game *Visiput* :

As is clear from the description of *Visiput* on p.2, the central concept of *Visiput* is the 'visibility' of a point. Figure 4 demonstrates the calculation of 'visibility' in a square grid where the pre-defined set of imaginary lines is the 8 lines emanating from the point going

through the closest 8 points. The circles represent grid points, hollow squares represent points that are illuminated with the player's colour, pluses represent points that are illuminated with the opponent's colour. The arrows emanating from few of the points mark the imaginary lines that are used to compute the 'visibility' for these points. For point 15, three of the lines (left, left-bottom, right-bottom) do not pass through illuminated points, and hence have the value 0. Of the rest of the lines, for three lines (top, top-left, right) the closest illuminated point is in the player's colour, so have the value 1, and for 2 lines (bottom and top-right) the closest illuminated point is in the opponent's colour, so they have the value -1. Summing this eight values gives point 15 'visibility' of 1 for the player.

For points on the border of the grid, some of the lines have always a value of 0. For example, for point 16 the three top-lines are always 0. The left line also has the value 0. The bottom-left, bottom and right lines have value 1, the bottom-right line has value -1, and the total 'visibility' is 2. Similarly, point 17 has 5 lines which are always 0.

As the examples demonstrate, the 'visibility' of a point for a player is potentially dependent on the status of points that are very far away. In addition, the 'visibility' of a point is a dynamic state and changes many times as the game progresses. In general, every move can change the 'visibility' of many points, because each point is on the imaginary lines emanating from many points. For example, if the player plays in point 18 in Figure 4, it will increase by 2 the 'visibility' of all the points on the line from point 18 to point 15 and continuing to the end of the board, because for each of these points one of the imaginary lines goes through point 18 and has value -1, and this line will change its value to 1 once the player switches on point 18. On the other hand, this move will not affect the 'visibility' of point 16 and the points between them, because the line from point 16 to point 18 has already a value of 1. If the player plays in point 15, it will increase by 1 the 'visibility' of all the points on the line from point 15 to point 18 and continuing to point 19, because the line from all of these points through point 15 currently has the value 0, and when the player plays in point 15 the value changes to 1.

Figure 5 (same notation as Figure 4) demonstrates the calculation of 'visibility' in an hexagonal arrangement, with the pre-defined set of imaginary lines being the 6 lines through the 6 closest points. For point 20, the value of the lines left, bottom-left and top-right is 1, top-left and right is -1, bottom-right 0, and the total 'visibility' is 1. For point 21, left is 1, top-left and bottom-right are -1, the rest are 0, and the total is -1.

By definition, when the value of a line is 1 for one player, it is -1 for the other player. Therefore the 'visibility' of each point for one player is the negative value of its 'visibility' for the opponent. Since points are legal moves for a player only if its 'visibility' for this player is bigger than or equal to some fixed value, a player can prevent his opponent's from playing in a point by increasing its 'visibility' for himself, and hence decreasing the 'visibility' for the opponent. To win, a player needs to prevent his/her opponent from playing in as many points as possible, while at the same time ensuring that the opponent does not prevent him/her from playing in many points. Because of the long range of 'visibility' and its dynamic nature, *Visiput* requires a long-term planning and manoeuvres which are coordinated across the whole board, and has a considerable strategic depth.

A specific embodiment of the invention will now be described with reference to the accompanying drawings:

Figure 1 shows the conceptual structure of the board.

Figure 2 shows a sketch of the electronic components of an example board.

Figure 3 is a sketch of the way the board looks for players from above.

The inputs of grid points 1 are implemented by a custom-design membrane keyboard 7 on a PCB 6, which together comprise the top of a flat rectangular box. The membrane keyboard contains a grid of 9x9 translucent buttons 1, which are in a shape of small domes. Between the buttons the membrane is painted with lines 8 drawn on the imaginary lines connecting the centres of the buttons. The PCB 6 has holes below each button, with additional holes 9 for the turn lights. Both the PCB 6 and the membrane keyboard 7 has a hole for the alphanumeric display 11.

The illumination of the grid points is implemented by 9x9 pairs of LEDs 2 mounted on a PCB 12, which is itself mounted below the membrane keyboard such that each LEDs pair 2 is under the centre of one of the buttons 1. In each pair one LED is of one colour (e.g. green) and the other of another colour (e.g. red). Alternatively, each LEDs pair can be replaced by a bi-colour LED. The two turn lights 5 are implemented by two large LEDs, one in one of the colours of the pairs of LEDs 2, and one in the other colour, mounted on PCB 12 as the rest of the LEDs. The electronic circuitry to drive the LEDs 2 and the turn lights 5 is also on PCB 12.

The membrane keyboard 7 also contains several control buttons 10, which allow the users to control the game (start, stop etc.) and to select which game is played and set parameters for the current game. An alphanumeric display 11 is mounted in a hole in the membrane keyboard 7. The control buttons 10 and the display 11 together comprise the control area 4 of Figure 1.

All the input from the membrane keyboard goes to the games manager 3, which is a small CPU (around 5MIPS) and a little ROM and RAM (around 32Kb and 6 Kb respectively). The games manager 3 is placed below the LEDs PCB 12. A custom design electronic circuitry (denoted by arrows from the membrane keyboard 7 to the games manager 3, and from the games manager 3 to the PCB 12 and to the display 11) allows the games manager 3 to switch on and off each individual LEDs, and to display the appropriate information in the alphanumeric display.

Figure 3 shows a sketch of the board from above in a middle of a game, with some grid points illuminated. Most of the grid points are not illuminated (circles with points). Some of the points are illuminated in one of two colours (indicated in the figure by two different shading). Because the buttons are translucent (rather than transparent), the LEDs 2 are not actually visible.

The embodiment of the grid points which is described above seems to be the most effective with current technology, but some parts can easily be changed if and when other technologies improve or new technologies become available, without affecting the overall design of the board. The detection of pressing a grid point may be done by any discrete

input device, for example standard contact switch and capacitive switch. The illumination of the grid points can be done by other kind of sources, for example gas-discharge lamps and incandescent lamps.

In the embodiment which was described above the players press the grid points with their fingers. This is very convenient, which is one of the advantages of the board. However, it has a problem that the board cannot distinguish which player is pressing a point, so the players can press a point out of their turn. The possible solutions to this problem seem to be too cumbersome and in some cases too expensive, so they are not included in the preferred embodiment. However, some of the solutions may prove to be convenient and cheap enough to be acceptable, and if the board is used for formal tournaments it may become an essential requirement.

A cheap and simple solution is to add two buttons on two sides of the board, one for each player, and the player will need to either hold down his own button while pressing a point or to first press his button and then press the point.

Another solution is to have two probes connected to the board, and the players use them to press the points. The contact between the probe and the board creates a short circuit which the board detects and hence can tell which probe, and hence which player, presses the point. An advantage of this solution is that it means that the sensor in each grid point can be a simple conducting element, instead of the membrane keyboard which is described above, which may make the board actually cheaper. Alternatively this method can be used to detect which player presses a point, in combination with another method to detect which point is pressed. For example, a membrane keyboard can be coated with a conducting layer, and the short circuit is caused when the probe touches this layer. In this case the membrane keyboard will detect which point is pressed, and the short circuit detects which player presses it.

Another variation of this solution is that the board emits some signal (electromagnetic or maybe ultrasound), and the probe detects this signal, and the probe that detects the signal more strongly is the one that actually presses. In this case the probe does not need to touch the board, so may be worn by the players, rather than held, which is more convenient. Another variation is that the probe interferes with or reflects the signal, and the board uses this response to detect which player presses the board. In this case, the probe does not need to be connected to the board. Alternatively, the probes themselves may emit different signals.

The solution above requires the players to hold or wear an object, which is uncomfortable. A possible solution is to mark the fingers of the players, by some material that adhere to the skin, and that the board can detect. Even more advanced technology may be able to recognise the fingers of the players directly.

The software:

The central loop of the software repeats these four steps:

- 1) Check if any of the control buttons was pressed. If any control button was pressed, perform the appropriate operation (change the game, set a parameter, stop the game, start the game).
- 2) Check if any of the grid points was pressed. If so, compute the implications according to the rules of the current game, perform all the changes to the board, and then switch the turn to the other player. Switching the turn means switching the turn light of the current player off, setting the internal variable *current_player* to the other player, switching the turn light of the other player on and setting a variable, the *turn end mark*, to the current time plus the turn time.
- 3) Check the clock and compare it to various time marks. A time mark is a variable set to some value, which is compared to the current time. The most important is the turn end mark, and if this is passed, switch the turn as in 2. Other time marks are for updates of the displays.
- 4) Check if there are game specific operations to perform. If a player plays one of the two-players games against the board, this check perform the board's move.

Managing *Visiput*:

The example board has these settable parameters for the game *Visiput*:

- 1) number of points that should be switched on when the game starts. If this is 0, the game starts with a standard configuration of illumination. Otherwise it starts with half of the specified number points illuminated in each colour, in random locations.
- 2) The minimum 'visibility' for a point to be a legal move. This parameter ranges from -2 to 2, and defaults to 0.

When a player presses a point, the games manager traces all the lines from this point to check its 'visibility' for the player, and if this is too low rejects the move, and then marks all the legal moves for this player. This feature is quite important, because working out if a point is legal is not a simple task, and players can easily get it wrong. If the move is legal, the game manager switches the point on with the player's colour. It then check if all the empty point are already 'decided', where a 'decided' point is a point that is an illegal move for one player or for both, and no legal move can change it. If all the points are decided, the games manager switches all the 'decided' points where one player can play to this player's colour and finishes the game. This save the players this part of the game, which has no interest because no move can change the result.

CLAIMS

1 An electronic board comprising:

a grid of *grid points* on a flat surface, where each *grid point* is a visible element which is capable of detecting when it is pressed, and can be illuminated in two different colours, allocated to respective players, by an illumination source inside or below the surface; and

a *game manager* made of

a CPU and memory, connected electronically to the grid points and illumination sources such that it has complete control on which grid point is illuminated and in what colour, and it is notified whenever any of the grid points is pressed, and a computer program which is executed by the CPU,

which manages a one or more games, of which at least one game is played according to these rules:

Each player in their turn switch on an unilluminated point with their colour by pressing it, provided it is a legal move;

the legality of a point for a player is evaluated by checking in turn each of a pre-defined set of imaginary straight lines emanating from the point, assigning a value of 0 to each of these lines that does not pass through an illuminated point, a value of 1 if the closest illuminated point that it passes through is illuminated with the colour of the player, and -1 if it is in the opponent's colour, then comparing the sum of the values of all the lines to a fixed number, and if the sum is larger or equal the point is a legal move for the player;

the game ends when neither of the players has a legal move, and the player with more points of his/her colour wins.

2 A board as described in Claim 1, where the arrangement of the points is square.

3 A board as described in Claim 2, where the set of virtual lines is the 8 lines emanating from the point and going through the closest 8 points.

4 A board as described in Claim 1, where the arrangement of the points is hexagonal.

5 A board as described in any preceding claim, where the fixed number which is used in determining the legality of a move is 0.

6 A board as described in any preceding claim, where pressing a point is done by special implement that causes a short circuit which the board uses to identify the point that is pressed.

7 A board as described in any preceding claim, where the players use, hold or wear a special implement which identifies which player is playing by communicating with the board.

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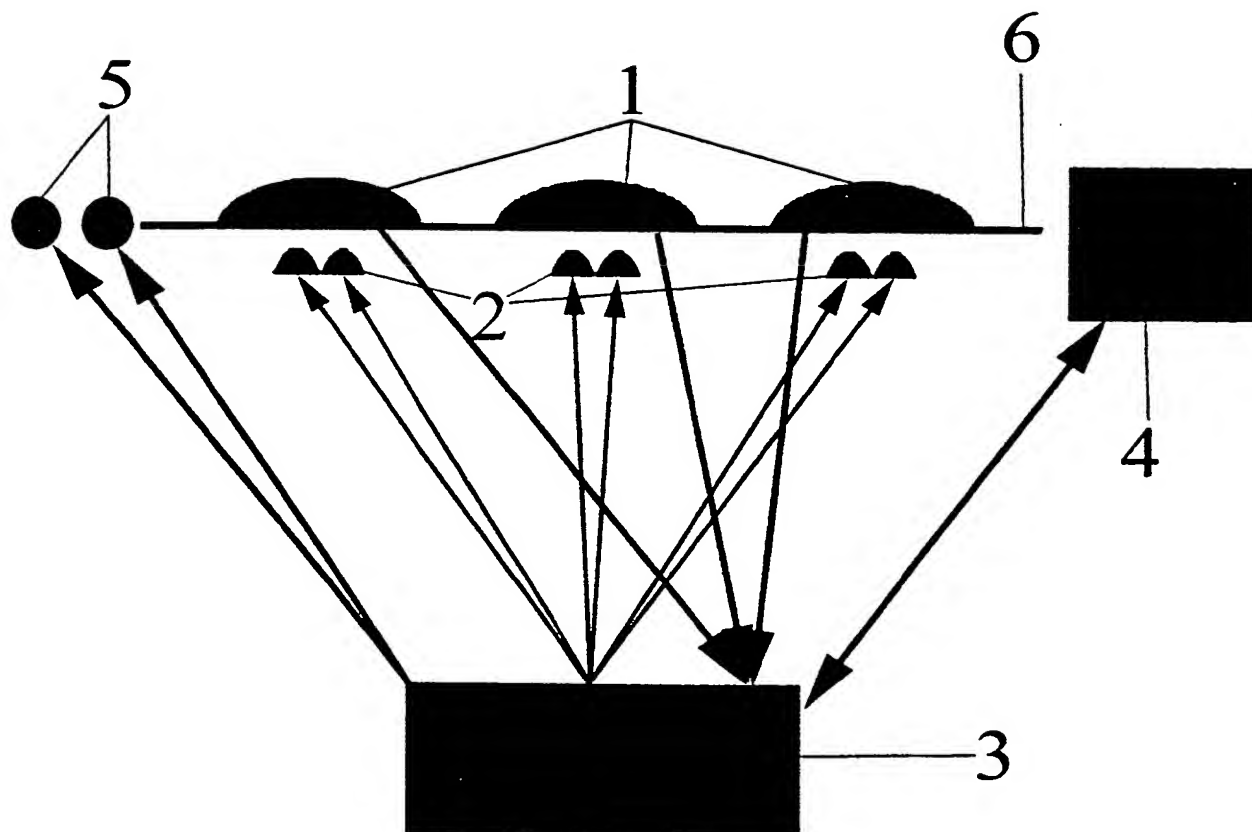


Fig 1

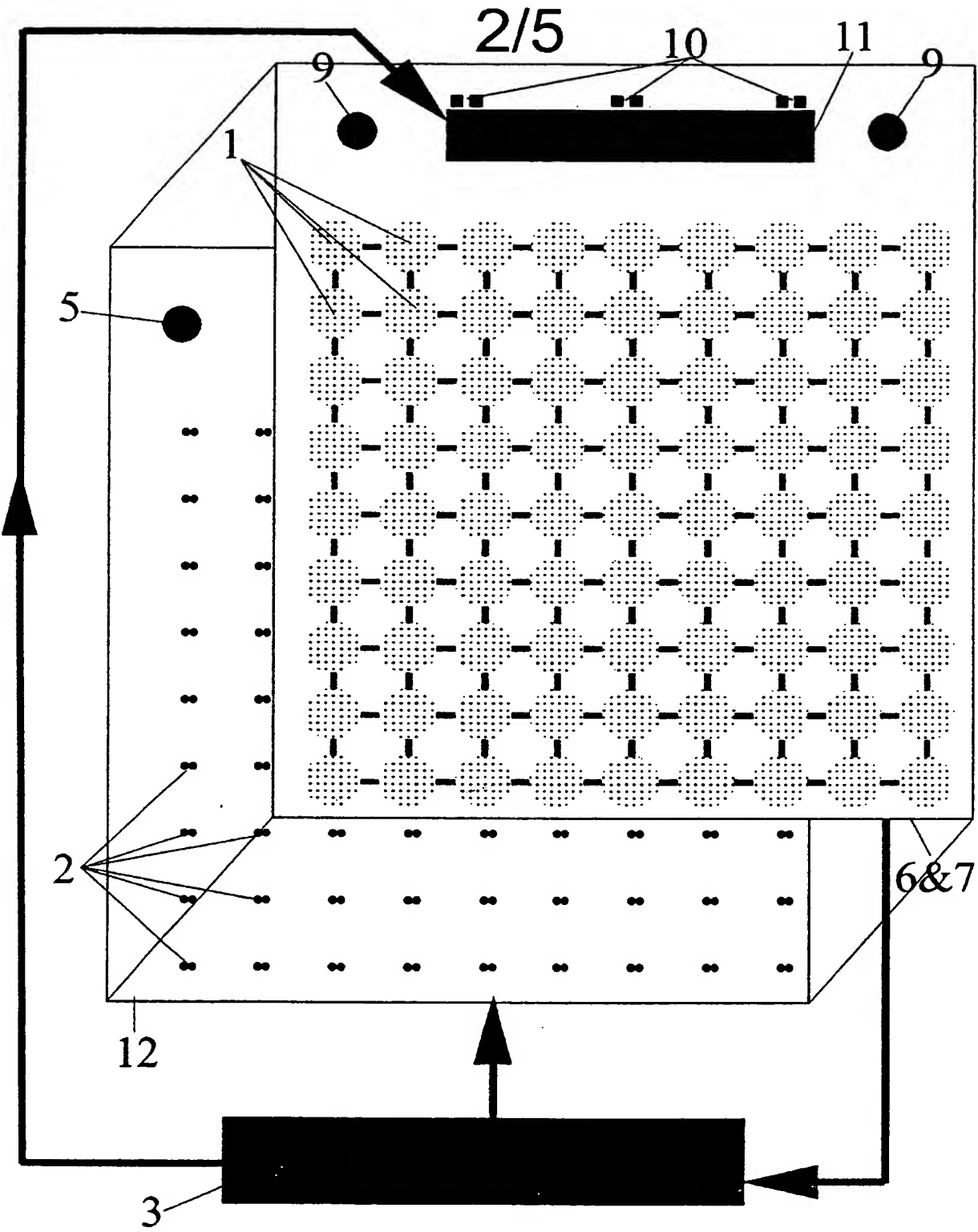


Fig 2

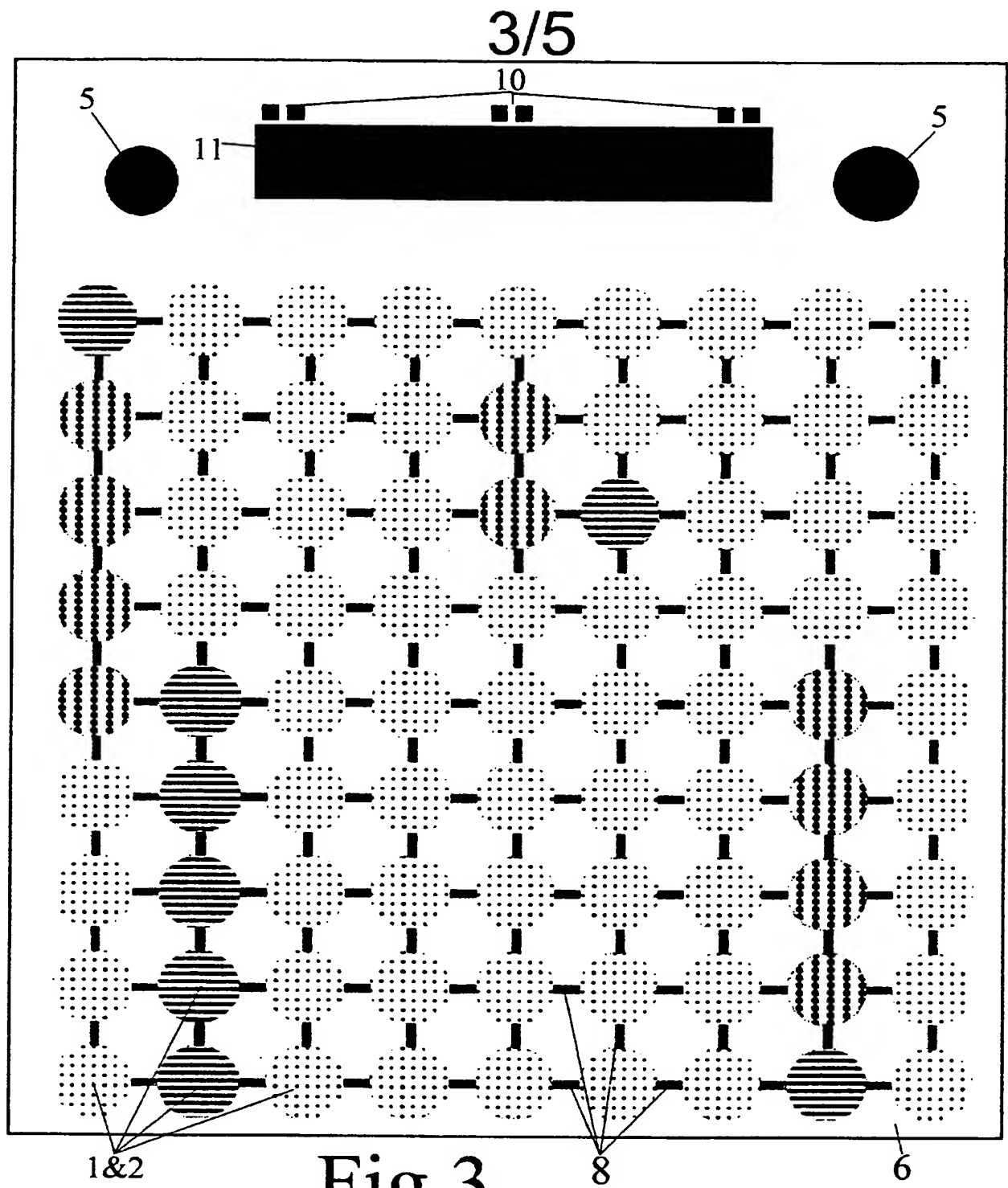


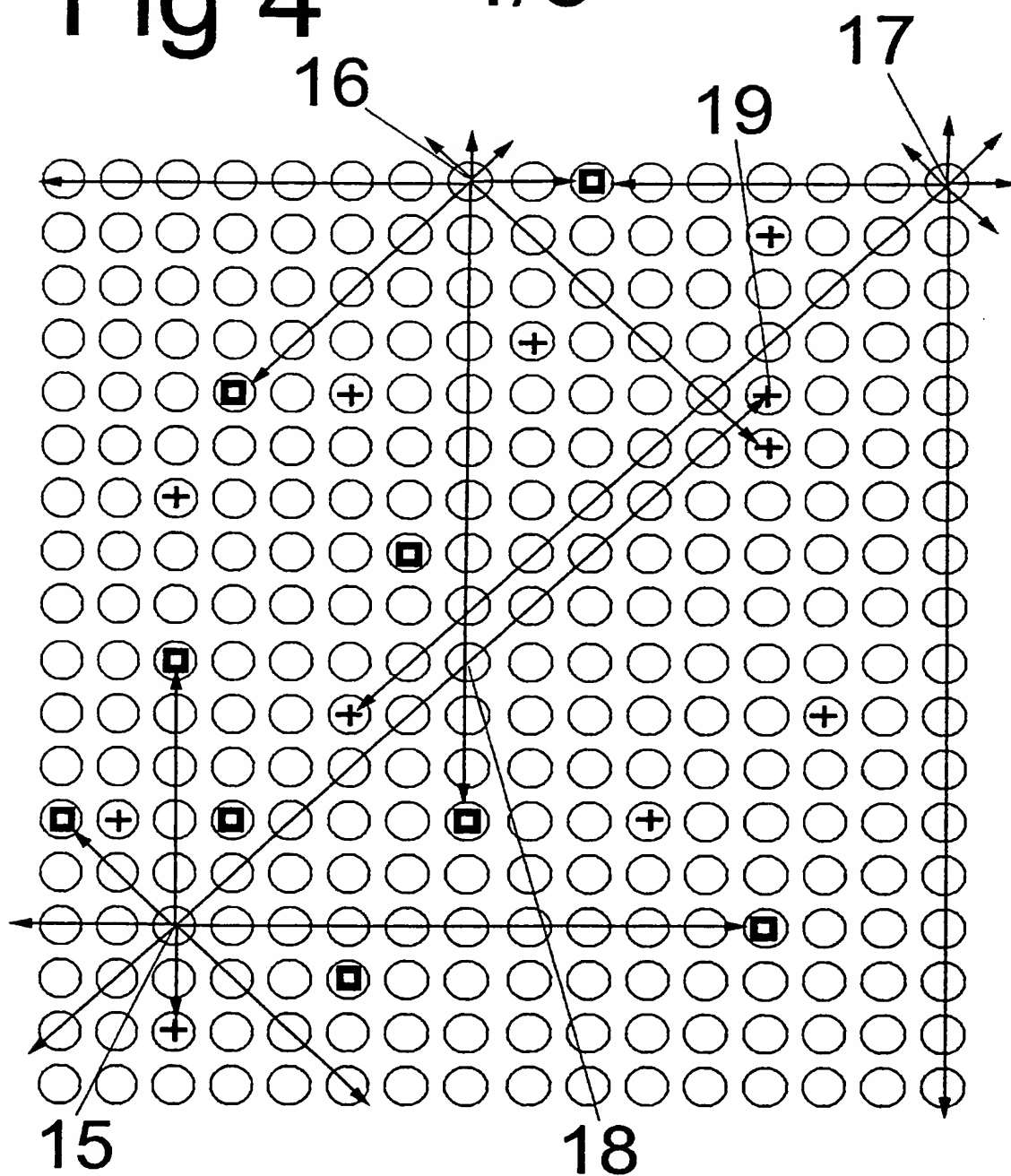
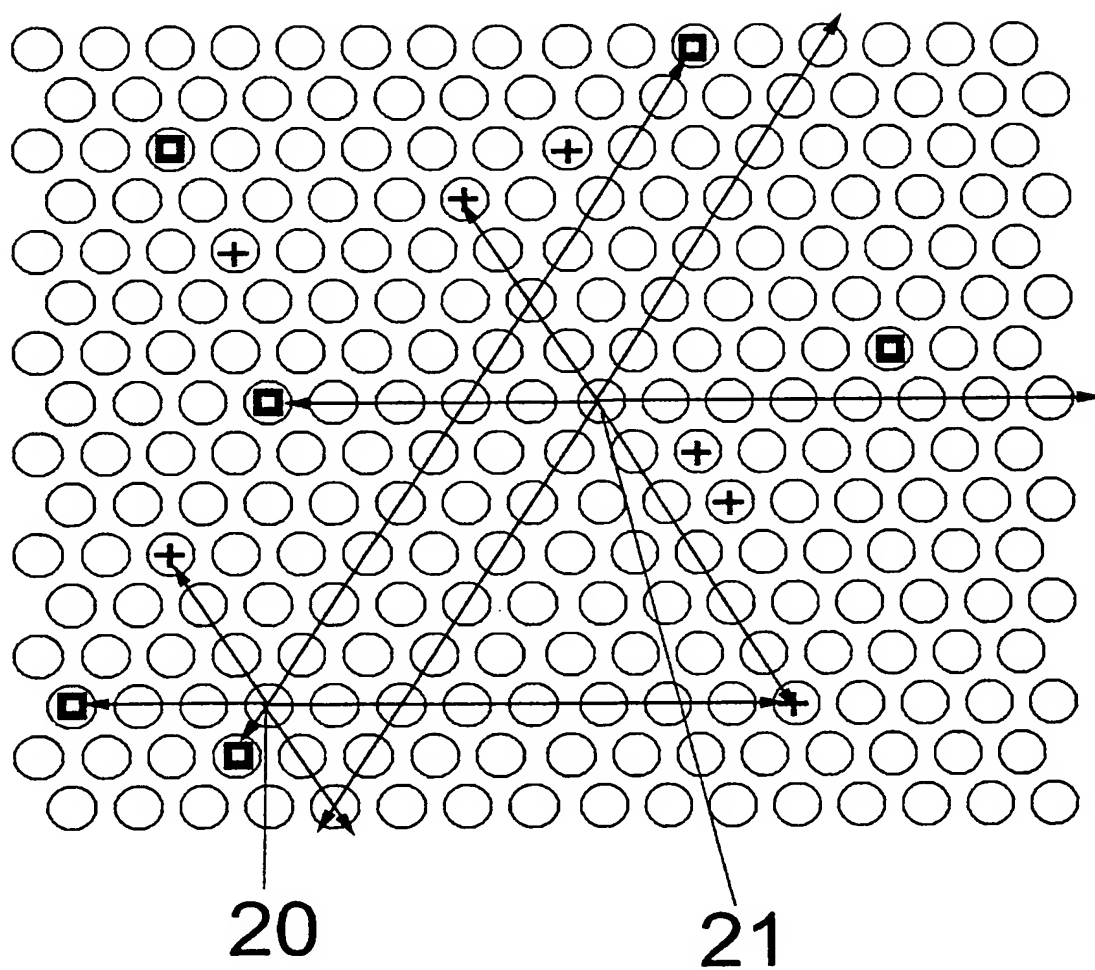
Fig 4 4/5

Fig 5

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INTERNATIONAL SEARCH REPORT

Inter Application No

PCT/GB 00/02656

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A63F3/02 A63F3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A63F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 019 226 A (ATARI) 31 October 1979 (1979-10-31) page 1, line 68 - line 100 page 1, line 114 -page 2, line 8 claims 1-5; figure 1 ---	1,2
A	WO 98 19758 A (GOLAD) 14 May 1998 (1998-05-14) the whole document ---	1,2
A	WO 97 26057 A (TIGER ELECTRONICS) 24 July 1997 (1997-07-24) the whole document ---	1
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International Application No

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